MID-AMERICA COORDINATION COUNCIL, INC.

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In the Matter of)
)
Amendment of Part 97 of the)
Commission's Rules Governing) **RM - 8737**
the Amateur Radio Service to)
Facilitate Spread Spectrum)
(S/S) Communications)

To: The Commission

STATEMENTS IN OPPOSITION

Commenter is an extra-class amateur radio operator and is in third, two-year term as Frequency Coordination Chairman of the Mid-America Coordination Council, Incorporated (MACC), the largest consortium of recognized volunteer state and regional Coordination entities in the United States.

While the Petitioner (the League) represents itself as being 'the' national association of amateur radio operators in the United States, it should be recognized that they are not the only one or that their interests do not necessarily represent all of the amateurs when their membership is actually less than 30% of the entire licensed amateur population. In this particular filing they do not even represent a majority of the members they do claim, nor did they solicit input from their general membership before initiating this in-house Proposal. While Commenter is a 24-year member of the League, and generally supportive of their positions, their special-interest-serving Proposal is not shared in this instance.

The Proposal selfishly diminishes' harmful interference' as an inconvenience. Be respectfully advised that a marginal signal trying to access a repeater for emergency purposes would probably disagree when the deliberately introduced S/S noise has further degraded his signal to an unusable degree. The League previously sought to further erode the integrity of repeaters by earlier appendation of 97.311(b)'s "[U]nintended triggering of carrier operated repeaters is not considered to be harmful interference"

The League asserts that "There have not been, in the League's experience, any established instances of actual interference to narrow-band amateur communications from SS (spread spectrum) communications." This is untrue. In their own publication, *1988 ARRL Handbook,* page 21-14 they admit "The SS signals were inaudible to amateurs in QSO, but the signals did cause some interference by keying certain repeaters that did not have a receiver carrier sense activation delay."

The further incompatibility of this mode, among narrow band users, is discussed in *Spread Spectrum Techniques*, by Robert C. Dixon, 1976 IEEE Press, page 15, whereas:

> "(I)t has been suggested that more efficient use of the available spectrum might be made by assigning both narrow-band and wide-band users the same frequencies for concurrent use. Under the right conditions, such concurrent use would be quite practical. The burden of achieving practicality would necessarily fall on the spread spectrum users, however, because of the fact that most of the frequency spectrum is already filled with narrow-band users who got there first, and the cost of modifying the present narrow-band sets would be astronomical."

The preceding exerpt was written twenty years ago. The Commission's good offices do not need to be reminded that overall spectrum usage, including amateur use, has since increased narrow-band activity tenfold within those two decades. The operations of thousands of 70 cm repeaters alone could be compromised, as well as considerable satellite, weak-signal and packet activities. The above source recently disclosed to the League's Rocky Mountain Division Director, Marshall Quiat, AG0X, that spread spectrum could indeed interfere with existing narrow-band operations.

The League's proposal makes reference to reports from an STA holder, Robert Buass, K6KGS. This Commenter attended a League-sponsored spread spectrum forum in Long Beach, CA, on September 3, 1995, that also heard reports presented by Mr. Buass. Some observations of which follow:

1. For mathematical convenience two meter 'frequency hopping' tests were set up on 25 kHz increments, even though it was known that the area band plan adhered to 15/20 kHz channel separations.

2. This 'off frequency' testing was done on the repeater outputs rather than on the inputs, hardly representative of 'testing' that would display meaningful results in the RF environment of interest.

3. There was no notification to the general weak-signal, satellite or repeater community of when these tests were to be performed. It was stated that operators could have called them or the coordinator if they experienced any interference from this 'testing', yet did not publicize the event/s or inform coordinators, some of whom were in attendance, or any regional coordinator of such operation in progress . . . how would they have even known these tests were going on, must less try to identify the source of any resulting interference?

4. When asked if it was tried on a repeater input, the answer was in the affirmative, but declined to say which one or with whom, when asked.

5. During concerns raised by one representing hundreds of weak-signal operators, the Chair was willing to offer protection to their part of the band, but balked at offering the same protection to the other coordinated users. If this mode is so transparent, why would this protection even be necessary?

While the STA holder was certainly enthusiastic and knowledgeable in the CDMA subject, the 'test results' were seriously flawed and bore little resemblance to an unbiased evaluation and presentation.

As far as the technology itself, I would offer some further observations from a frequency coordinator's standpoint. Spread Spectrum has been presented by some as being a 'transparent panacea' as an answer to continued spectrum crowding. 'Transparent' in that existing users of the band will be unaware of its encroachment. 'Panacea' in that it will accommodate virtually unlimited QSO's while coexisting unobtrusively among the many users of various modes.

My experience with this mode indicates otherwise. Most recently I was vocationally involved with an engineering evaluation of the 'direct sequence' type of spread spectrum transceivers, operating within the license-free Part 15, 902-928 MHz spectrum. While evaluating a commercial unit, an IFR spectrum analyzer revealed 15 MHz of sine waves spaced about 16 kHz apart, more than 900 of them, with the voice envelope superimposed on each one. When modulated with a Firebird digital bit-error-rate instrument, the valleys in the above sine waves increased to the level of the peaks and complete saturation resulted with an attendant increase in the 'noise-floor' of the 15 MHz of occupied spectrum.

This deliberately introduced 'noise' envelope in the spectrum is well illustrated in pro-Spread Spectrum articles in the May '89 issue of *QST* and the June '89 issue of *73* Magazine. The author presents spectral displays wherein the resultant 'hump' in the noise floor is "only" 10 dB above the spectrum threshold. This 'hump' begins at 442 MHz and extends to 450 MHz! The article continues with 'lock' being maintained at over a mile with a quarter-wave antenna and only 390 milliwatts of power. The changes inherent when coupled with typical gain antennas combined with the power levels amateurs are legally capable of is most distressing. Just the power increase from 390 milliwatts to the legal S/S limit of 100 watts is about 24 dB, add to that a typical antenna gain of three to 12 db and a serious compromise of existing systems and operations would seem most evident. The cumulative effect of multiple users would further increase the noise floor and interference potential.

It cannot be persuasively argued that Spread Spectrum is a mode which promotes a spectrum efficient means of communication, when in fact it could alter the operational characteristics of thousands of existing coordinated repeaters and systems. The cumulative effect of increased S/S 'noise' on the bands would render carrier-accessed repeaters inoperable by having to continually tighten the squelch to overcome the keying caused by the increase in the noise floor. The introduction of CTCSS would only mask the problem, minimize nuisance keying, and give the operator one more access method to remember. Unknowing transient operators might be denied access completely. Weak-signal and satellite interests would be affected as well. Just because the direct sequence S/S may exceed the bandwidth of typical narrow band users' equipment, does not mean the RF amplifying stages within the rig doesn't know it's there. It just means that the recovered signal must be that much stronger, yet, to be recovered within the increased noise threshold deliberately introduced by the S/S wide-band emissions.
The military and State Department did not utilize S/S emissions in an effort to enhance spectral management and efficiency. Its primary purpose, development and implementation was to mask the source and content of enciphered communiques for Department and other security-oriented agencies.

Lastly, let me make it clear that I am not anti-spread spectrum per se. But I AM against the insertion and utilization of ultra wide-band modes into bands that could compromise the operations of hundreds of thousands of existing users in the name of progress alone. If this Proposal's unrestricted mode must be accommodated within the bands, confine it to the applicable portions of the 902-928 MHz spectrum, where they can coexist with other S/S users. Coordinators make every effort to maintain some degree of coherence within their bands of responsibility and accommodate the delicate proportional balance between the interests of the vast majority and those of lesser-used modes. Compromising the interests of 99% of the bands' users to accommodate the 1% special interests is grossly inconsiderate.

The safeguards defined within 97.311(c) and (d), the Proposal seeks to delete, are as necessary today as when they were originally implemented. With these controls in place, there was at least an opportunity to ascertain the source of any interference experienced. With the virtually unlimited encoding schemes proposed this will be nearly impossible with the resources readily available to most users in the affected bands. The enciphering possibilities will be much like the thousands of encoding combinations with commonly available garage door openers.

There is also deep concern about the attractiveness of this enciphering capability to the criminal element. If this proposal is adopted, this ostensible 'progress' would pervade the diminishing ham bands. This technology is available to this element now on other bands, we don't need to introduce and encourage its further use in our minimal ham bands, too.

Again, I respectfully request the Commission's good offices **DENY** this Proposal . . . a Proposal wherein only the vendors would benefit.

WE Brown